

Removable Tie-Down Clip and Method of Making Same

Field of the Invention

[0001] This invention relates generally to the fastening of objects to structures, and more particularly to fastening such objects to reusable clips secured in a gap in the structures, such as, for example, in the spacing between decking planks.

Background of the Invention

[0002] The need frequently arises to secure free-standing items to more sturdy surfaces, such as outdoor decks to prevent them from moving around on windy days. Items such as barbeque grills, tables, chairs, etc., are typically tied to housing or decking structures with ropes or chains, or brought indoors to prevent them from being blown around and being damaged or causing damage to the surroundings. Homeowners wish to avoid spending copious amounts of time preparing for storms or windy days. Thus, a need exists for an easily configured and reusable fastening mechanism for securing such items to existing structures and surfaces.

[0003] There is a similar need to removably moor watercraft to docks. A marina typically has docks and moorings to which a boat may be secured when it is not in use. Permanently attached lines and docking cleats are not always available in sufficient numbers at the edge of every dock. And typical dock attachment means cannot be easily and conveniently attached or removed from a plank dock once they are mounted. Conventional docking cleats are secured by drilling the dock planks to create mounting holes. Once secured, the cleat may be very difficult and inconvenient to remove so that it may be used elsewhere. Accordingly, a fastening mechanism that is portable and adaptable to a variety of surfaces would be valued by boaters, who could carry the fastening mechanism(s) in their watercraft.

[0004] There is a further similar need among contractors and others who transport equipment and other items from one location to another in carrier vehicles to be able to simply and quickly secure the equipment to the vehicles. Flatbed trucks and trailers have surfaces for supporting the

equipment during transport. A fastening mechanism for securing equipment in such vehicles in a quick, reliable manner could prevent unwanted shifting and/or loss during transport. The ability to stabilize items would extend the usefulness of such fastening mechanisms to applications involving picnic tables, wherein items such as portable grills, lanterns and supplies can be secured to the picnic tables.

[0005] Previous attempts to satisfy some of these needs include multi-component mechanisms requiring permanent modification or damage to the deck surface such as, for example, screw eyes threaded into the deck or through-bolted, fastening cleats, or rope that passes through drilled bore-holes in decking for attachment to deck supporting members underneath the surface. These methods not only are unsightly, but also require modification to the deck and they limit the ability to easily relocate the items to be secured without having to repair the areas to which they had been previously secured.

[0006] Preferably, the fastening mechanism should be inexpensive to manufacture, easy to install, and easy to use. It should be removable so as not to obstruct normal use of the securing surface (*e.g.*, deck or dock) and/or loading or unloading the equipment onto the vehicle. Use of the fastening mechanism to prevent theft is potentially another benefit.

Summary Of The Invention

[0007] The present invention provides a removable, reusable fastening clip suitable for temporary or permanent securing of objects to surfaces that have holes or gaps therein. For example, environments in which the fastening clips are particularly suited include decking and docks comprised of planks, or flat surfaces of transport vehicles that have slits or cut-out grooves in them. The planks that are arranged with slight gaps to form deck and dock surfaces, and the portions of the noted vehicle surfaces disposed on either side of such a gap or groove, will collectively be referred to herein as "surface members," even though in the vehicle surface

context there may be but one surface in which there is a gap to accommodate fastening clips in accordance with the present invention.

[0008] Typical uses of the clips include securing items such as barbeque grills, canopies, tables, umbrella stands, planters, pool equipment, storage containers to a residential deck, or for cleat-less fastening of watercraft and other items (floats, life saving equipment, etc.) to docks. The clips may also be used to secure items such as, for example, lawn mowers, snow blowers, building materials, etc., to the deck of a trailer during transportation, or for holding equipment in place during new construction, such as air compressors that tend to move around when in use due to vibration. While these examples of surfaces with which the clips may be employed are flat and generally horizontal, usage of the clip is not necessarily limited to such an environment. For example, objects may be similarly secured to any vertical surface using the clips, provided the surface includes surface members exhibiting a relatively small gap and a finite width. The clip is typically used in conjunction with some type of connector or tie-down, such as ropes, bungee cords, hooks, chains, hasps, strap, etc., for the purpose of securing items from undesired movement.

[0009] The objects set forth above as well as further and other objects and advantages of the present invention are achieved by the embodiments of the invention described hereinbelow. A preferred embodiment of the clip comprises a single element such as, for example, a wire formed into multiple, substantially co-planar sections. The clip includes a head such as, for example, a ring loop that has dimensions suitable to receive a portion of one of the connector types noted above or equivalents thereto. The clip head may take a variety of shapes, but provides a substantially closed or contiguous aperture through which the connectors can be connected, and the clip head has a maximum dimension (*i.e.*, outer diameter for the ring embodiment) that is greater than the width of the gap between the surface members (*e.g.*, deck planks) to prevent the clip head from slipping through the gap between the surface members.

[0010] Extending from the clip head are a pair of elongated legs that are substantially coplanar with the head and of sufficient length so as to extend from the head on one side of the surface members through the gap to another side of the surface members. In an alternative embodiment, a portion of each leg is twisted about a corresponding portion of the other leg, preferably the legs are twisted about one another, preferably in a region that will not be inserted into the gap between surface members. The twisted region may even prevent the clip from completely slipping through the gap between surface members.

[0011] At the end of each leg is a foot that diverges in a direction opposite that of the foot on the other leg. The feet extend outward and away from one another, and in alternative embodiments lie either substantially in the same plane as the head and legs or in a plane ~~not~~ that ^{PPB} is at an angle (preferably perpendicular) with respect to the head. In an alternative embodiment discussed below, the clip may be fastened in a gap between surface members in such a manner that the legs are side-by-side but neither is precisely in the same plane as the clip head. The geometry of the feet may be straight or curved, and optionally at the end of each foot may be an upward curling or cornering feature for additional adherence to or penetration into the lower side of the surface member. The very tips of the feet may additionally be tapered or beveled to further enhance adherence to the bottom surface of the surface members.

[0012] The clip is preferably composed of a spring tempered, high-strength and corrosion-resistant material and formed such that the legs will naturally separate from one another so as to each engage an opposing surface member for added fastening strength.

Brief Description of the Figures of the Drawing

[0013] For a better understanding of the present invention, together with other and further objects thereof, reference is made to the accompanying drawing and detailed description, wherein:

[0014] **Figure 1** is a schematic illustration showing an embodiment of a clip in accordance with the present invention, disposed between ~~two~~ ^{two} surface members;

[0015] **Figures 2A-F** are schematic illustrations showing alternative embodiments of the clip;

[0016] **Figure 3** is an illustration showing a method of installing the clip between two surface members; and

[0017] **Figure 4** is a schematic illustration of a clip engaged with deck planks and a joist and to which a bungee cord hook connector is fastened to secure an otherwise moveable object.

Detailed Description of Preferred Embodiments of the Invention

[0018] Referring now to **Figure 1**, a clip **10** in accordance with the present invention can be used to secure objects to support surfaces formed of surface members **12** of substantially uniform thicknesses **13** (such as, for example, a slotted wall section or the deck planks shown in **Figure 4**) having a gap **14** between them. The clip **10** is preferably comprised of a single element including multiple portions, including head **16**, a pair of legs **18**, and a pair of feet **20**. The clip is preferably composed of a high-strength, corrosion-resistant material for outdoor use, such as stainless steel, brass, aluminum, alloys, or other materials (*e.g.*, plastics) for lighter duty uses. Plating of the material selected to form the clip is an option if the intended application of the clip requires more corrosion resistance or strength. A symmetric design results in uniform stresses through the clip **10** for improved stability and holding power, and for reduced deformation under load.

[0019] In a preferred embodiment, the material is of a spring temper, such as spring temper 302 or 304 stainless steel, so that the clip **10** will hold its shape after original forming. This provides the added advantage of allowing the legs **18** to be spring-loaded, as the clip will attempt to regain its shape after installation, thereby engaging opposing edges of the surface members and thus aid in maintaining the clip's position in the gap **14**. As long as the gap **14** between the surface members **12** is at least as wide as the diameter of the clip legs, the clip can be slid between the surface members.

[0020] The head **16** forms a substantially closed or contiguous aperture **22** to or through which connectors (such as the bungee cord connector **24** of **Figure 4**) to the objects to be secured are established. Head **16** has a maximum dimension **26** (shown as the outer diameter of the ring-type embodiment of head **16**) which is greater than the width of the gap **14** between the surface members **12**.

[0021] The legs **18** extend continuously from the head **16** in substantially the same plane (the x-y plane as shown) as the head **16** and aperture **22**. The legs are dimensioned to fit in the gap **14** between the surface members and each has a length **28** longer than the thicknesses **13** of the surface members **12**.

[0022] The feet **20** extend from the ends of the legs **18** opposite the head **16** in divergent directions to a distant greater than the width of the gap **14**. In preferred embodiments, the feet remain substantially co-planar with the legs and the head **16**, but in certain alternative embodiments the term 'substantially' includes proximate parallel planes, and in yet other embodiments the feet are non-planar (*e.g.*, substantially perpendicular) with respect to an imaginary plane including the head **16**.

[0023] In one non-limiting example, 1/8" diameter stainless steel wire was used to form a fastening clip with adequate strength for residential uses. For heavier duty applications, such as tying up a boat or dock, the clip **10** can be made of thicker material, such as 1/4" or 5/16" or larger diameter wire. The diameter of the wire employed is obviously selected for the specific intended use. The dimensional tolerances of the clip can be relatively loose, provided the clip legs **18** fit within the gap **14** between surface members **12**. The length of the legs **18** (1-1/8" in the clip reduced to practice) is selected to work with the particular width **13** of surface members (*e.g.*, deck planks) to which the objects are to be fastened. The 1-1/8" leg length in this example is optimized for deck planks up to 1" thick (known as "5/4" stock"). For use on decks or docks constructed of "2 by" planks (*e.g.* "2 by 6") arranged with predetermined gaps between them, the actual plank thickness 1.5", an optimum leg length would be approximately 1-5/8". The leg length

of the clip **10** is slightly larger than the plank thickness. The diameter of the aperture **22** (1.0" in this example) is dependent upon the intended connectors **24** to be used. A hook of a bungee cord (such as in **Figure 4**) or a snap hook of a tie down strap works well with a 1" aperture diameter. This relatively small size provides both aesthetic and safety advantages. For boat docks, where large ropes or hooks may be used to tie up a boat, the diameter of the aperture is substantially larger.

[0024] As noted above, in the preferred embodiment, the head **16**, legs **18** and feet **20** are substantially co-planar before installation, and even after installation in many embodiments. This simplifies manufacturing, allowing automated equipment such as four-slide machines to form the clip **10** very inexpensively in high volumes with minimum tooling requirements. Single-piece construction eliminates the need to weld, braze, bond, thread, or otherwise attach multiple components to form the clip. Alternatively, a clip design wherein the feet **20**, or the feet **20** and the legs **18**, are not co-planar with the head **16**, can be made with slightly more complex tooling, but still provides the stated advantages of single-piece construction.

[0025] A variety of alternative embodiments of the clip **10** are illustrated in **Figures 2A-F**. The head **16** may take a variety of shapes other than the ring shown in **Figure 1**. **Figures 2A-B** show but two of the multisided variations, in addition to other ellipsoidal shapes, that the head **16** may take. The feet **20** may also take on a variety of shapes to better conform to the bottom sides of surface members **12**.

[0026] In the alternative embodiment of **Figure 2C**, the legs **18** are twisted about one another in one or more turns. The twists preferably end prior to the region of the legs that is intended to traverse the thickness of the surface members, so as not to impede insertion of the legs into the gap between the surface members.

[0027] **Figure 2D** shows feet exhibiting curved lengths, and **Figure 2E** show features **19** at the ends of the respective feet that may embed into the bottom sides of the surface members to attain greater lateral stability. The features **19** are also formed from the same single element and

are co-planar with and point in the general direction of the head **16**, but may optionally be beveled or tynd to facilitate embedding into the surface members.

[0028] **Figure 2F** illustrates yet another alternative embodiment of the clip wherein the feet ²⁰~~30~~ are not co-planar with the head **32**. Rather, the feet ²⁰~~30~~ of this embodiment are at any angle (preferably 90 degrees) with respect to an imaginary plane including the head. RBB

[0029] With reference to **Figure 3**, the clip **10** is installed by inserting the feet **20** vertically downward through the gap **14** between surface members **12** until the feet traverse the gap to the bottom side of the surface members. Then the clip is twisted axially (about an imaginary axis **15** extending along the length of the clip) approximately 1/4 turn (90 degrees) until the head **16** is perpendicular to the gap **14**. The clip **10** is then preferably drawn laterally (in the direction of arrow **17**) along the gap **14** until it abuts a floor joist **19** or other supporting cross-member under the surface members, thereby securing the clip in three dimensions. Once the feet **20** abut the joist, any tendency of the clip **10** to rotate or spring out of position is eliminated. The connector **24** (such as shown in **Figure 4**) being fastened to the clip head **16** should be attached so the direction that the secured object might undesirably be displaced maintains the clip contact with the joist. Although wooden planks are typical for most decks and docks, the clip will work equally well on platforms comprised of composite materials or metal, and surface members that have non-flat top and/or bottom surfaces. In the environment illustrated in **Figure 3**, the width of the gap **14** (shown as approximating the respective diameter of each of the legs) does not allow the legs **18** of the clip **10** to separate. Thus, when the clip is axially twisted 90 degrees during installation, one leg will ride in front of the other, locking it in place. In the case of wider gaps between the surface members, the spring-loaded legs will separate and thus return entirely back into the same plane as the head **10** of the clip and engage the sides **21** of the adjacent surface members (*i.e.*, deck planks).

[0030] After installation, the judicious dimensioning of the head **16** and feet **20** will ensure that the clip **10** is not displaced vertically (*i.e.*, it will not pull out of or slip through the gap **14**).

With reference to **Figure 4**, The clip **10** may be installed and removed at any point in the gap **14** between surface members **12**, except where supporting joists **30** are in close proximity to the planks thereby preventing lateral movement of the clip **10**. Positioning the clip such that it abuts a joist **30** can advantageously prevent slippage when securing objects to decks, picnic tables and similarly supported surfaces. If there are no pre-existing cross-member joists available at the position where placement of the clip(s) is to occur, temporary cross-members or brackets may be attached to the top or bottom of the surface members to prevent rotation or slippage of the clip(s).

[0031] Padlocks and/or theft-resistant connectors **24** may be employed with the clips **10** to secure items against theft or authorized use.

[0032] While the invention has been described in connection with specific embodiments thereof, it will be understood that it is capable of further modification, and this application is intended to cover any variations, uses, or adaptations of the invention following, in general, in principles of the invention and including such departures from the present disclosure as come within known or customary practice in the art to which the invention pertains and as may be applied to the essential features hereinbefore set forth, and as fall within the scope of the invention and the limits of the appended claims.

[0033] I claim: